IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A communication system comprising:

a transmission path for serving as a transmission medium of light;

a first station ~~having means for emitting~~ which emits time-divided optical pulses ~~divided by a first time-dividing means~~ into the transmission path, returns optical pulses modulated at a second station into the transmission path, and measures ~~and for measuring~~ a phase difference between the optical pulses returning from the transmission path; and

[[a]] the second station ~~which reverses traveling directions of the optical pulses, the second station~~ including,

a polarization beam splitter splitting the time-divided optical pulses into first orthogonally polarized components and second orthogonally polarized components,

a first phase modulator receiving the first of the split optical pulses and ~~modulation means for~~ producing the phase difference[[,]] corresponding to a value of a random number bit ~~to be transmitted,~~ between the time-divided optical pulses ~~divided by the first time dividing means~~, and

a second phase modulator receiving the second of the split optical pulses after polarization direction of the second of the split optical pulses is rotated by 90 degrees, producing a same phase difference as the first phase modulator between the first of the optical pulses, and modulating the orthogonally polarized components of each optical pulse to have a phase difference of 180 degrees therebetween,

wherein an output of the first phase modulator is combined with an output of the second phase modulator after the polarization direction is rotated by 90 degrees, and then the combined output returns into the transmission path

~~a second means for splitting each entering optical pulse into orthogonally polarized components,~~

~~second phase modulation means for producing a 180-degree phase difference between the orthogonally polarized components,~~

~~means for rotating each polarization direction by 90 degrees, and~~

~~means for combining the orthogonally polarized components and for reemitting the optical pulses into the transmission path~~.

Claim 2 (Canceled).

Claim 3 (Currently Amended): The communication system according to Claim 1, wherein a single phase modulator is <u>configured as the first phase modulator and configured as the second phase modulator</u> ~~used for the first phase modulation means and the second phase modulation means~~.

Claim 4 (Canceled).

Claim 5 (Currently Amended): The communication system according to Claim <u>3</u> [[4]], wherein after each ~~entering~~ optical ~~pulses~~ <u>pulse entering the second station</u> is split into the orthogonally polarized components, distances along which the split polarized components propagate before entering the phase modulator are set to be different for each polarized component, and by temporally varying driving voltage, the phase difference corresponding to the value of the random number bit and the 180-degree phase difference between the orthogonally polarized components are produced at the same time.

Claim 6 (Currently Amended): The communication system according to Claim 3 [[4]], wherein after each ~~entering~~ optical ~~pulses~~ pulse entering the second station is split into the orthogonally polarized components, optical paths along which the split polarized components propagate before entering the different terminals of the phase modulator are composed of a polarization-maintaining optical fiber.

Claim 7 (Original): The communication system according to Claim 6, wherein by orienting a polarizing axis of the polarization-maintaining optical fiber along electric-field vectors of the orthogonally polarized components of the entering optical pulse, the split polarized components are combined with their polarization directions rotated by 90 degrees.

Claim 8 (Currently Amended): The communication system according to Claim [[4, 5,]] 5 or 6, wherein a Faraday rotator modulates the orthogonally polarized components of each optical pulse to have a phase difference of 180 degrees therebetween ~~is used as the means for producing the 180-degree phase difference between the orthogonally polarized components~~ and ~~the means for rotating~~ rotates the ~~each~~ polarization direction by 90 degrees.

Claim 9 (Currently Amended): The communication system according to Claim 1, wherein ~~a polarization beam splitter is used as the means for splitting each of the optical pulses into the orthogonal components and the means for combining the orthogonal components, and~~ antireflection termination is provided at a port, from which a polarized component resulting from a deviation from the polarization rotation angle of 90 degrees is output, of the polarization beam splitter.

Claim 10 (Currently Amended): The communication system according to Claim 1, wherein the second station has means for attenuating intensity of each optical pulse to include no more than 1 photon per bit when reemitting the optical pulses into the transmission path after combining the output of the first phase modulator with the output of the second phase modulator ~~orthogonally polarized components~~, so that a quantum cryptographic key is distributed.

Claim 11 (Currently Amended): A communication method comprising:

emitting, at a first station, time-divided optical pulses ~~divided by a first time-dividing means~~ into a transmission path, returning optical pulses modulated at a second station into the transmission path, and measuring a phase difference between the optical pulses returning from the transmission path; [[and]]

~~reversing, at a second station having the transmission path, a traveling direction of the optical pulses,~~

splitting, by a polarization beam splitter at the second station, the time-divided optical pulses ~~second time-dividing means, the optical pulses divided by the first time-dividing means~~ into first orthogonally polarized components and second orthogonally polarized components;[[,]]

receiving, by a first phase modulator at the second station, the first of the split optical pulses, and producing~~, by first phase modulation means,~~ the phase difference[[,]] corresponding to a value of a random number bit ~~to be transmitted,~~ between the time-divided optical pulses; ~~divided by the first time-dividing means,~~

receiving, by a second phase modulator at the second station, the second of the split optical pulses after polarization direction of the second of the split optical pulses is rotated by 90 degrees, producing a same phase difference as the first phase modulator between the first

of the optical pulses, and modulating the orthogonally polarized components of each optical pulse to have a phase difference of 180 degrees therebetween; and

combining, at the second station, an output of the first phase modulator with an output of the second phase modulator after the polarization direction is rotated by 90 degrees, and then returning the combined output into the transmission path

~~producing, by second phase modulation means, a 180-degree phase difference between the orthogonally polarized components divided by the second time-dividing means,~~

~~rotating, by means for rotating, polarization direction of each polarized component by 90 degrees,~~

~~combining, by means for combining, orthogonally polarized components of each optical pulse, and~~

~~reemitting the optical pulses into the transmission path~~.

Claim 12 (Canceled).

Claim 13 (Currently Amended): The communication method according to Claim 11, wherein a single phase modulator is configured as the first phase modulator and configured as the second phase modulator ~~used for the first phase modulation means and the second phase modulation means~~.

Claim 14 (Canceled).

Claim 15 (Currently Amended): The communication method according to Claim 13 [[14]], wherein after each ~~entering~~ optical pulse entering the second station is split into the

orthogonally polarized components, distances along which the split polarized components propagate before entering the phase modulator are set to be different for each polarized component, and by temporally varying driving voltage, the phase difference corresponding to the value of the random number bit and the 180-degree phase difference between the orthogonally polarized components are produced at the same time.

Claim 16 (Currently Amended): The communication method according to Claim 13 [[14]], wherein after each ~~entering~~ optical pulse entering the second station is split into the orthogonally polarized components, optical paths along which the split polarized components propagate before entering from the different terminals of the phase modulator to the polarization beam splitter is composed of a polarization-maintaining optical fiber.

Claim 17 (Original): The communication method according to Claim 16, wherein by orienting a polarizing axis of the polarization-maintaining optical fiber along electric-field vectors of the orthogonally polarized components of the entering optical pulse, the split polarized components are combined with their polarization directions rotated by 90 degrees.

Claim 18 (Currently Amended): The communication method according to Claim [[14, 15,]] 15 or 16, wherein a Faraday rotator modulates the orthogonally polarized components of each optical pulse to have a phase difference of 180 degrees therebetween ~~is used as the means for producing the 180-degree phase difference between the orthogonally polarized components~~ and ~~the means for rotating~~ rotates the ~~each~~ polarization direction by 90 degrees.

Claim 19 (Currently Amended): The communication method according to Claim 11, wherein ~~a polarization beam splitter is used as the means for splitting each of the optical pulses into the orthogonal components and means for combining the orthogonal components, and~~ antireflection termination is provided at a port, from which a polarized component resulting from a deviation from a polarization rotation angle of 90 degrees is output, of the polarization beam splitter.

Claim 20 (Currently Amended): The communication method according to Claim 11, wherein the second station has means for attenuating intensity of each optical pulse to include no more than 1 photon per bit when reemitting the optical pulses into the transmission path after the combining of the output of the first phase modulator with the output of the second phase modulator ~~orthogonally polarized components~~, so that a quantum cryptographic key is distributed.